AMENDMENTS TO THE SPECIFICATION

Please amend the **abstract** of the specification as detailed below.

> ~~Embodiments of the present invention include an~~ An apparatus, method, and system for an electronic assembly with a thermal management device which includes a microporous medium are described herein.

Please amend the following **paragraphs** of the specification as detailed below.

[0009] **Fig. 1** illustrates a cross-sectional view of an electronic assembly **20** including a thermal management device **38** in accordance with an embodiment of this invention. In this embodiment the thermal management device **38**, including a porous medium **56**, may be coupled to a heat source **24** to at least facilitate management of heat generated by the heat source **24**. This facilitation of heat management of this embodiment may include thermally coupling the heat source **24** to a remote heat exchanger **17**.

[0012] In one embodiment, the porous medium **56** may be substantially disposed within a case **48**. The case **48** may have an inlet **40** and an outlet **44**. In one embodiment the inlet **40** may be coupled to a pump **15** and the outlet **44** coupled to a heat exchanger **17** by pipes that are adapted to transport cooling fluids between the components. The pump **15**, which may include an external motor and a pumping mechanism internal to the pipe, may create a pressure change to at least assist the flow of the cooling fluid from the inlet **40** to the outlet **44** through the porous medium **56**. This may result in interstitial movement of the cooling fluid over an extended surface area. The extended surface area may result in more contact, and therefore potentially more convection heat transfer between the porous medium **56** and the cooling fluid. The total contact surface area may be related to the porosity of the porous medium. In one embodiment of the present invention the porosity of the porous medium may be between 80%-95% by volume fraction of air.

[0013] The porous medium **56** may also serve to enhance the heat transfer coefficient due to local thermal dispersion caused by recirculating eddies that are shed

in the wake of fluid flow past fibers of the porous medium **56**. This, in turn may help to reduce the thermal resistance from the heat source **24** to the heat exchanger **17**, which could increase the total amount of heat transferred per volume of cooling fluid passed through the porous medium **56**. The cooling fluid may exit the case **48** through the outlet **44** and transfer a portion of the thermal energy from the heat source **24** to the remote heat exchanger **17**. The heat exchanger **17** may be any known or to be designed heat dissipation mechanism. In one embodiment the heat exchanger **17** may dissipate excess thermal energy from the cooling fluid and present the fluid to the pump **15** so that it may be reintroduced to the thermal management device **38**. Examples of the cooling fluid may include, but are not limited to a gas (e.g., air) and a liquid (e.g., water, alcohol, perfluorinated liquids, etc.).

[0022] In one embodiment a heat spreader **68** ~~(not shown)~~ may be placed over the heat source **24** and attached to the substrate **28**. The heat spreader **68** may be used as an intermediary step to disperse at least a portion of the heat generated by the heat source **24** over its surface area. The heat spreader **68** may be attached to the substrate **28** by a sealant material and thermally coupled to the heat source **24** with a thermal interface material. In this embodiment, the thermal management device may be placed on the heat spreader **68** with a thermal interface material, similar to above embodiment.

[0023] In one embodiment the thermal management device **38** may use two-phase cooling. Two-phase cooling may occur when heat from the heat source **24** transforms a cooling liquid into a vapor. As the vapor flows away from the heat source **24** towards the heat exchanger **17** it may cool and condense back into liquid, which may result in a release of its latent heat of vaporization. The fibers and overall density of the porous medium **56** may prevent the formation of large air bubbles that may inhibit heat transfer and restrict the quality of the vapor-fluid mixture at the outlet of the thermal management device **38**. Additionally, the fibers on the porous medium **56** near the heat source **24** may assist the onset of boiling by acting as nucleation sites. Whether or not the cooling fluid will evaporate and lead to two-phase cooling may depend on the amount of heat generated by the heat source **24**, as well as the flow rate

of the cooling fluid. For example, in one embodiment high heat production and low flow rates may be more likely to result in two-phase flows.

[0026] In one embodiment the cavity **72** may be the same size or even slightly smaller than the porous medium **56** and the case **70** may be heated such that the cavity **72** expands large enough to be positioned over the porous medium **56**. As the case **70** cools down it may shrink to form a tight fit. The case **70** may have an inlet **71** and outlet **73** for the cooling fluid flow. The inlet **71** and outlet **73** may be attached to a pump 15 and heat exchanger 17, respectively, similar to the embodiment described in **Fig. 1**. In one embodiment a watertight seal may be formed between the heat source **24** and the case **70**, which may prevent cooling fluid from leaking from the thermal management device **64**. In an embodiment an epoxy sealant **76** may be used to seal any gap between the case **70** and the die. As shown in the illustrated embodiment, the epoxy sealant **76** may also serve to provide a seal between the case **70** and the substrate **28**, which may reinforce the watertight seal. The epoxy sealant **76** may also at least facilitate the support of the thermal management device **64**, which could reduce the amount of torsion transferred to the connections between the porous medium **56**, the heat source **24** and the substrate **28**.

[0027] **Fig. 3 (a)** shows a cross-sectional view of an electronic assembly including a thermal management device with a porous medium **56** illustrating an evaporation/condensation cycle, in accordance with an embodiment of the present invention. In this embodiment, there may be a relative hot spot located near the middle of the heat source **24**, as shown by the corresponding temperature graph in **Fig. 3 (b)**. Die containing integrated circuits may display these non-uniform heat intensity distributions due to concentrated current flow for one reason or another. In one embodiment it may be possible to customize the case **80** and porous medium **56** to account for these concentrated heat distributions and thereby at least facilitate the thermal exchange between the heat source **24** and the heat exchanger 17.